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The possibilities of reacclimatisation of pond turtles (*Emys orbicularis*, Emydidae, Testudines)

Abstract — Pond turtles (*Emys orbicularis*) were under observation in Lithuania (1978-1989), Byelorussia (1986), Georgia (1986, 1987), Turkmenia (1987), Ukraina (1988), Krasnodar (Russia 1988), Azerbaijan (1989).

The investigation showed that the factors which compel the pond turtles (*Emys orbicularis*) to settle in some specific territory exist in the structures of stations and microstations.

The works on reacclimatisation of the pond turtles may be divided into the following blocks. 1. Informational block: a) complex investigations on the «donor» of population; b) complex investigations on the biotop of «recipient»; c) modeling of the parts of the biotop «donor» in the laboratory. 2. The preparing block: a) breeding of the turtles in captivity; b) increasing the number of «donors»; c) approximating the structures of «recipients» to that of «donors». 3. Work block: a) transportation of individuals; b) monitoring.

Riassunto — Possibilità di riacclimatizzazione della testuggine palustre europea (*Emys orbicularis*, Emydidae, Testudines).

Alcune tartarughe palustri europee sono state tenute in osservazione in Lituania (1978-1989), in Bielorussia (1986), in Georgia (1986, 1987), in Turkmenia (1987), in Ucraina (1988), in Krasnodar (Russia 1988) e in Azerbaijan (1989).

Gli studi hanno mostrato che nelle strutture delle stazioni e delle microstazioni esistono dei fattori che costringono le testuggini palustri europee (*Emys orbicularis*) a insediarsi in alcuni territori specifici.

I lavori eseguiti sulla riacclimatizzazione delle testuggini palustri europee possono essere suddivisi nei tre gruppi seguenti. 1. Informazioni: a) studi sul «donatore» della popolazione; b) studi sul biotipo del «ricevente»; c) elaborazione di modelli in laboratorio di alcune parti del biotipo «donatore». 2. Preparazione: a) accoppiamento delle testuggini in cattività; b) aumento del numero dei «donatori»; c) approssimazione delle strutture dei «riceventi» a quelle dei «donatori». 3. Lavoro di campo: a) trasporto degli individui; b) monitoraggio.

Key words: *Emys orbicularis*, population, reacclimatisation, station, microstation.

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Introduction

The area of pond turtles (*Emys orbicularis*) stretches from the North America through the whole Europe to Ural mountains. It is hard to believe that today it is an integral territory without blank places with the development of industry, increasing cities, the number of suitable biotops catastrophically decreases. One can hear signals of danger from many regions of Europe: Poland, Germany, Italy, Czechoslovakia. The inventory of the area part existing in the USSR showed that number in population is decreasing everywhere. On the other hand, the degree of adaptability is astonishing. Micropopulations that are found at the borders of the area remain vital in seemingly unsuitable conditions.

The aim of the article is to try to prove the existence of levels of regulation due to the observations in regulation in laboratory, to clear out the possibilities of their adaptation for reaclimatisation.

Material and methods

Pond turtles (*Emys orbicularis*) were under observation in Lithuania (1978-1991), Byelorussia (1986), Georgia (1986, 1987, 1991), Turkmenia (1987), Ukraine (1988), Russia (1988), Azerbaijan (1989).

The information concerning the possibilities of groups or populations control in Lithuania was gathered in the reservation Kuculishkes where 46 turtles (93%) were marked for this purpose aluminium plates (11 × 7 mm) with numbers.

They were fastened on the upper part of the carapace with the help of melthiore wire (1 mm. diameter) through two wholes made at the edge of radialia shell. We used plastic two colour plates for individual marking which were fastened under the aluminium ones.

The long-term observations of the marked individuals in the same population, the comparison of the results in different parts of the areas enabled us to raise the declared hypothesis of reaclimatisation.

Exposition

The investigations showed that the factor which compel the pond turtles (*Emys orbicularis*) to settle in some specific territory exist in the structures of stations and microstations. The following components of the biotops necessary for normal activity of population:

1. winter lodges (in countries with cold climates),
2. places for mating,
3. places for laying eggs,
4. places for feeding.

Winter lodges (undrying, unfreezing waters) - protect from unfavourable climate conditions, concentrate individuals of both sexes thus facilitating spring search.

Mating places (shallow, quickly warming waters) - make suitable conditions for copulation, for formation of egg cover.

Egg laying places (stations of special structures in the slopes south or south-east sun exposition) - if chosen optimally according to the existing climatic conditions increase the possibilities of successful embryo development.

Nourishing places (waters with lots of food) - enable to prepare for wintering, for the new cycle of breeding.

Studying the seasonal and 24th activity with reference to the factors the mentioned above the following dependence draws out:

1. the concentration of individuals, the strategy of copulation depends upon the number of winter lodges and their biotop,
2. the strategy of the females spring migration depends upon the number of egg laying places and their location,
3. the choice of egg laying places depends upon the degree of imprinting, the structure of microstation,
4. the choice of summer feeding places depends upon abundance of their food stock structures of places suitable for warming and their situation.

From the point of view of suitability for the species the most ideal structure for the biotops would be when the places for winter mating and feeding and egg laying places would be as near as possible. To our mind the biotop of the turtoises looked just like this in the times of marsh tortoise flourishing. Unfortunately, the surroundings have changed due antropogenic influences so greatly today that it is almost impossible to verify this hypothesis.

It is evident that the tortoise becomes extinct with destruction of one of these links. In most cases it would be enough to restore it and the tortoises would do the rest. But there will also be such cases when it will be necessary not only to restore the structures of the biotops parts but also to deport some numbers of animals. The result will be achieved only when in a new territory (recipient) connection ties of breeding (male-female-egg laying place) and feeding (tortoise-food object) will start functioning by themselves.

The works on reacclimatisation of the marsh tortoises may be divided into the following blocks:

1. Informational block
 - a) complex investigations on the «donor» of population,
 - b) complex investigations on the biotop of the «recipient»,
 - c) modelling of the parts of the biotop «donor» in the laboratory.
2. The preparing block
 - a) breeding of the tortoises in captivity,
 - b) increasing the number of «donors»,
 - c) approximating the structure of «recipients» to that of «donors».
3. Work block
 - a) transportation of individuals,
 - b) monitoring.

The work of the informational block and breeding in captivity should be carried on simultaneously. How and what structures are to be created in a «recipient» will become clear only after thorough ecological-behavioural investigation of the «donor», modelled in the laboratory. That means that after reacclimatisation the work is to be carried out in all directions simultaneously.

The work block is of great importance. The tortoises are prepared for transportation in autumn. Sexually mature individuals and unmated young ones of 6-7 years are let out into a fenced part of «donor's» wintering place.

At the same time small turtoises of 3 years old are chosen and adjusted to lower temperature (imitation of wintering).

Reptiles are carried from «donor» to «recipient» early in spring. They are caught, transported and let out only in water (as aquarium fish). Great differences in temperature should be avoided.

Number of individuals may fluctuate depending on the number of initial population. To our opinion no less than 50 mature females, 10 males, 50 six year old ones and 100 three year old ones should be transferred during the first year. The last ones should be let out into natural environment later when the temperature in a shoal reaches 20°C.

The main thing which should be expected in spring of the same year is going out of females into the «recipient's» egg-laying places. After egg laying they should be returned to the native places. It will let to repeat everything the next year. The concrete result of this work is that the newly born little turtoises are protected from enemies and will successfully reach the water.

And the finishing touch. The little turtoises born even in «recipient's» territory spend two first winters of their life in the artificial places where conditions are brought near to natural.

While summing up the following things should be accentuated. Reacclimatisation is a complex long-term process, the main principle of which is that the animals are transferred within the present or former territory. The aim is to restore or to build up stable nutritional and mating relation of the species in a new biotop.

Conclusions

1. The ecological-behavioural analysis of the populations of pond turtoises show that in parts of biotop structure there exist levels of ruling animals groups.

2. With their help it is possible to restore the damaged links of the population, to accomplish the reacclimatisation.

3. The reacclimatisation is theoretically possible if only one of the components mentioned above of the population is left.

4. Population individuals are used for reacclimatisation only of the same or geographically parallel zone.

5. Individuals are transferred during their least seasonal activity. Females after laying eggs and individuals trying to leave the new biotop are brought back to the old one.

6. While keeping the first-year turtoises in captivity it is necessary to form conditions near to natural («recipient»). Water composition, food objects, temperature memorising (imprinting) should be kept in mind.